REMARKS

In the Office Action dated January 13, 2010 and marked final, the Examiner rejects claim 14 under 35 U.S.C. § 102(b) and rejects claims 1-13 and 15-18 under 35 U.S.C. §103(a). Claims 1, 13-25 and 17 have been amended and claims 2 and 16 have been canceled. Claims 19 and 20 are new. After entry of this Response, claims 1, 3-15 and 17-20 are pending in the Application. Reconsideration of the Application in light of the arguments herein is respectfully requested pursuant to 37 C.F.R. §1.114.

Applicants submit that the amendments made herein are fully supported in the specification and drawings and add no new matter. In particular, the addition of the discharge circuit being printed on one or more of the positive-electrode layer, the negative electrode layer and electrolyte layer is explicitly stated in paragraph [0050]. New claim 19 is supported in Fig. 2 and paragraphs [0042]-[0046] and new claim 20 is supported in Fig. 19 and paragraph [0052].

Rejections under 35 U.S.C. §102(b)

The Examiner rejects claim 14 under 35 U.S.C. § 102(b) as being anticipated by Hisamitsu et al. (US 2004/0038123) Claim 14 recites in part a bipolar battery cell that comprises a plurality of electric cells. Each electric cell comprises a bipolar electrode including a collector having a positive-electrode layer on one surface and a negative-electrode layer on an opposing surface, an electrolyte layer and a discharge circuit printed on one or more of the positive-electrode layer, the negative electrode layer and electrolyte layer that electrically balances charged conditions of adjacent bipolar electrodes.

Hisamitsu et al. fails to teach or suggest a discharge circuit printed on one or more of the positive-electrode layer, the negative electrode layer and electrolyte layer that electrically balances charged conditions of adjacent bipolar electrodes. Hisamitsu et al. discloses providing shared voltage measurement tab electrodes that allow voltages to be measured for the plurality of unit cells. (¶[0013]). In the first embodiment, shared voltage measurement tab electrodes 10 and 18 allow voltages of the unit cells to be measured. (¶[0044]). The second embodiment differs from the first in that the collectors are formed with two rows of voltage measurement tabs.

(¶[0097]). The third embodiment shows voltage measurement tabs on both sides of the collector. (¶[0106]). As clearly seen in the figures, the tabs of Hisamitsu et al. extend outside of the cell. In none of these embodiments is charging or discharging mentioned. That is because no circuitry has yet been disclosed. The voltage tabs do not contain circuitry. Circuitry is not discussed until the fourth embodiment. Each of embodiments 1-3, as described in the fourth embodiment, can be provided with a controller CU1 having sockets provided to receive the voltage measurement tabs. The controller has a current bypass circuit that connects the positive electrode and the negative electrode. (¶[0117]). It is within this controller that the Hisamitsu et al. discharge circuit is located. (See ¶¶[0119]-[0128]). Applicants' claim requires that the discharge circuit be printed on one of the layers within the electric cell. As noted in Applicants' specification, the invention has a built-in discharge circuit that can automatically balance the charged conditions without using voltage detecting wires and bypass wires. This is clearly seen in Applicants' figures. The controller recited in claim 14 is shown in FIG. 14 and described in ¶[0078] and is separate from the claimed discharge circuit. The controller determines <u>when</u> balancing is occurring, rather than performs the balancing.

Because Hisamitsu et al. fails to teach or suggest a plurality of electric cells, each having a discharge circuit that electrically balances charged conditions of adjacent bipolar electrodes, wherein the discharge circuit is provided on the same surface of at least one layer of the positive-electrode layers, the negative-electrode layers, or the electrolyte layers as required by the claim, claim 14 is not anticipated by Hisamitsu et al. Applicants respectfully submit that claim 14 is thus allowable over Hisamitsu et al.

Rejections under 35 U.S.C. §103(a)

The Examiner rejects claims 1, 2, 5-12 and 18 under 35 U.S.C. § 103(a) as being unpatentable over Horie et al. in view of Hisamitsu et al. Claim 2 has been canceled. Independent claim 1 (and claims 5-12, 18 and new claims 19 and 20 by their dependency) recites a battery having a plurality of electric cells, *each electric cell comprising* a bipolar electrode including a collector having a positive-electrode layer on one surface and a negative-electrode

layer on another surface; an electrolyte layer that exchanges ions between the positive-electrode layer and the negative electrode layer; and *a* discharge circuit printed on one or more of the positive-electrode layer, the negative electrode layer and electrolyte layer that electrically balances charged conditions of adjacent bipolar electrodes.

Horie et al. fails to teach or suggest a discharge circuit printed on one or more of the positive-electrode layer, the negative electrode layer and electrolyte layer that electrically balances charged conditions of adjacent bipolar electrodes. The Examiner cites ¶[0062] for support that Horie et al. discloses electrically sensing charged conditions. However, ¶[0062] discloses that sensing is done with the photosensor, which, as shown in FIG. 8, is a separate unit not provided within each electric cell. In addition, the Examiner correctly states on page 4 of the Office Action that Horie et al. does not disclose a discharge circuit that electrically balances charge conditions.

The Examiner states that Hisamitsu et al. discloses a discharge circuit 50. However, as explained above with respect to claim 14, that discharge circuit is again located in controller CU1 and is not provided within each electric cell that electrically balances charged conditions of adjacent bipolar electrodes. Combining Horie et al. with Hisamitsu et al. might further prevent deterioration of the battery as the Examiner contends. However, the combination does not teach, suggest or render obvious providing the discharge circuit printed on one or more of the positive-electrode layer, the negative electrode layer and electrolyte layer, as required by the claim. The Examiner seems to be ignoring this important element of the claim, the importance of which is clearly described in Applicants' specification. Accordingly, the combination of Horie et al. and Hisamitsu et al. fails to teach, suggest or render obvious claim 1 and its dependent claims. Applicants submit that claim 1 and its dependent claims are accordingly allowable over the cited references.

The Examiner rejects claim 13 under 35 U.S.C. § 103(a) as being unpatentable over Horie et al. in view of Hisamitsu et al. Independent claim 13, similarly to claim 14, recites a discharge circuit printed on one or more of the positive-electrode layer, the negative electrode

layer and electrolyte layer that electrically balances charged conditions of adjacent bipolar electrodes. As explained above, Horie et al. does not disclose a discharge circuit. Hisamitsu et al. does not disclose a discharge circuit printed on one or more of the positive-electrode layer, the negative electrode layer and electrolyte layer. The discharge circuit of Hisamitsu et al. is provided in the controller CU1. For the foregoing reasons, claim 13 is allowable over the cited references.

The Examiner rejects claims 15 and 16 under 35 U.S.C. § 103(a) as being unpatentable over Horie et al. in view of Hisamitsu et al. Claim 16 is canceled. Independent claim 15 recites *laminating a bipolar electrode in*cluding a collector having a positive-electrode layer on one surface and a negative-electrode layer on another surface, with an electrolyte layer and a discharge circuit printed on one or more of the positive-electrode layer, the negative electrode layer and electrolyte layer that electrically balances charged conditions of adjacent bipolar electrodes. The bipolar electrode includes the discharge circuit, which is laminated. Horie et al. does not disclose a discharge circuit, and Hisamitsu et al. discloses circuitry within a controller outside of the laminated electrodes. For these reasons, claim 15 and its dependent claim 16 are allowable over the cited references.

The Examiner rejects claim 17 under 35 U.S.C. § 103(a) as being unpatentable over Horie et al. in view of Hisamitsu et al. Independent claim 17 recites that each electric cell comprises means for balancing the bipolar battery cell by electrically balancing charged conditions of adjacent bipolar electrodes, the means for balancing located on one or more of the positive-electrode layer, the negative electrode layer and electrolyte layer. Again, Horie et al. fails to disclose means for balancing electrodes, and Hisamitsu et al. fails to disclose discharge circuitry within each cell. Accordingly, the invention of claim 17 is not rendered obvious by the cited combination, and claim 17 is in condition for allowance.

The Examiner rejects claim 3 under 35 U.S.C. § 103(a) as being unpatentable over Horie et al. in view of Hisamitsu as applied to claim 1. Claim 3 depends from claim 1 to include all of the limitations therein and to further recite that the cell further comprises a contact area between the discharge circuit and an adjacent bipolar electrode that is more than 0.06 mm^2 per battery capacity of the bipolar battery 1 Ah. As noted above, neither Horie et al. nor Hisamitsu et al. discloses a discharge circuit printed on one or more of the positive-electrode layer, the negative electrode layer and electrolyte layer that electrically balances charged conditions of adjacent bipolar electrodes. Therefore, the combination cannot teach or suggest a contact area between the discharge circuit and the electrode. Claim 3 is thus allowable for this reason in addition to being allowable based on its dependency from allowable claim 1.

The Examiner rejects claim 4 under 35 U.S.C. § 103(a) as being unpatentable over Horie in view of Hisamitsu et al. as applied to claim 1 in view of Einthoven et al. (US 2003/0205775). Claim 4 depends from claim 1 to include all of the limitations therein and to further recite that a threshold of a discharge voltage in the discharge circuit is set between 3.6 V – 4.1 V, and that a doping concentration is set between $10^{17} – 10^{18}$ cm^{-3}, and the thickness of a depletion layer is set between 0.1 μm – 1.0 μm so as to set a breakdown voltage of a PN junction of the discharge circuit the same as to the threshold. As noted above, the combination of Horie and Hisamitsu et al. does not teach or suggest all of the limitations of claim 1. Einthoven et al. does not cure the deficiencies of the combination. Therefore, the combination fails to render obvious the invention of claim 1, and therefore claim 4 by its dependency. Applicants respectfully submit that claim 4 is allowable over the cited references.

Conclusion

Reconsideration of the Application is requested. It is respectfully submitted that this Response places the Application in suitable condition for allowance; notice of which is requested.

If the Examiner feels that prosecution of the Application can be expedited by way of an Examiner's amendment, the Examiner is invited to contact the undersigned at the telephone number listed below.

Respectfully submitted,

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